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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/817,398

03/26/2001

Andrew E. Waterfall

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02/12/2004

WIGGIN & DANA LLP  
ATTENTION: PATENT DOCKETING  
ONE CENTURY TOWER, P.O. BOX 1832  
NEW HAVEN, CT 06508-1832

EXAMINER

ALAVI, AMIR

ART UNIT

PAPER NUMBER

2621

DATE MAILED: 02/12/2004

7

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/817,398

Applicant(s)

WATERFALL ET AL.

Examiner

Amir Alavi

Art Unit

2621

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 26 March 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-3 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-3 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 March 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 5.6.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### Claim Rejections - 35 USC § 103

- The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

- Claims 1-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Venkataraman et al. (US 6,501,471 B1) in view of Baldwin et al. (US 4,827,413) and further in view of Wang et al. (US 5,805,733).

Regarding claim 1, Venkataraman et al., disclose: compressing a first 3D image (Please note, figure 16, element 170 and figure 17, element 81); detecting changes between said first 3D image and subsequent time varied 3d images by dividing

each subsequent time varying 3D image into a plurality of sub-volume voxels (Please note, figure 17, elements 70-75, in correlation to column 9, lines 25-67. As indicated positions and properties of the tetrahedron of the current frame are updated based on changes from the previous frame).

However, Venkataraman et al., do not disclose wherein the 3D images are compressed using run-length encoding, but, Venkataraman et al., teaches that the tetrahedron are placed in back-to-front (BTF) order before or after compressing the tetrahedron, this ordering is used for compositing the tetrahedron (Please note, column 6, lines 18-38).

On the other hand, Baldwin et al., in the same field of endeavor disclose a similar volume rendering method (Please note, figure 2), that utilizes a modified BTF ordering algorithm, as such, Baldwin et al. teach that a series of run-length encoded vectors are generated from binary data representative of voxels because only end voxels need to be transformed to image space, since intermediate voxels do not need to be transformed, the result is a large savings in calculations (Please note, column 5, lines 39-58).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Venkataraman et al.'s BTF ordering to run-length encode the 3D image data, since Baldwin et al. teach that modifying the standard BTF method to include run-length encoding is more computationally efficient (Please note, column 8, lines 26-33).

Furthermore, neither Venkataraman et al., nor Baldwin et al., disclose wherein performing a chi-squared test on corresponding said voxels contained in each subsequent time varying 3D image and said sub-volume voxels in which was last detected a change.

However, Wang in the same field of endeavor discloses wherein a method for detecting scenes from a video sequence, as such, Wang teaches applying a chi-squared test to successive time-varying video frames (Please note, figure 4, element 405) and using the chi-squared test to determine scene changes (Please note, figure 4, element 407).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Venkataraman et al. and Baldwin et al.'s invention by utilizing Wang's detect changes incorporating a chi-squared test since Wang teaches that detecting changes through the application of a chi-squared test is advantageous for the purposes of automatically identifying different segments of a video.

Regarding claim 2, Wang teaches setting the chi-squared threshold to a predetermined value (Please note, column 4, lines 20-24), however, Wang does not expressly disclose the value being 0.95, on the other hand, one skilled in the art would have known to set the chi-squared value based on the degree of similarity (Please note, column 4, line 22) between image frames desired. As such, setting the threshold to a particular value is an arbitrary consideration and does not constitute a critical inventive aspect of the present invention.

Regarding claim 3, for each image frame after the initial frame, Venkataraman et al. only compresses and BTF orders the tetrahedron that have been touched (I.e. those containing voxels that have changes), (Please note, column 9, lines 33-41. Voxels that have not changed are reused rather than encoded again (Please note abstract). Thus, Baldwin et al.'s BTF ordering is only applied to changed voxels.

### **Other prior art cited**

- The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Kaufman et al. (US 6,674,430 B1) is pertinent as teaching apparatus and method for real-time volume processing and universal 3D rendering.

Rutherford et al. (US 4,679,094) is pertinent as teaching method for compression and transmission of video information.

Lengyel (US 6,614,428 B1) is pertinent as teaching compression of animated geometry using a hierarchical level of detail coder.

Deering (us 6,664,995 B1) is pertinent as teaching graphics system configured to interpolate pixel values.

Fenney et al. (US 6,313,846 B1) is pertinent as teaching texturing and shading of 3D images.

Eleftheriadis et al. (US 6,055,330) is pertinent as teaching methods and apparatus for performing digital image and video segmentation and compression using 3D depth information.

Li et al. (US 6,262,737 B1) is pertinent as teaching 3D mesh compression and coding.

## **Contact Information**

- Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Amir Alavi whose telephone number is (703) 306-5913.
- The Examiner can normally be reached on Monday through Thursday from 8:00 a.m. to 6:30 p.m. If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Leo Boudreau, can be reached at (703) 305-4706.

Art Unit: 2621

Any response to this action should be mailed to:

Assistant Commissioner for Patents

Washington, D.C. 20231

**Or faxed to:**

(703) 872-9306, ("draft" or "informal" communications should be clearly  
labeled to expedite delivery to Examiner)

**Hand delivered responses** should be brought to Crystal Park II, 2121 Crystal Drive, Arlington, VA., Sixth Floor (Receptionist). Any inquiry of a general nature or relating to the status of this application should be directed to the T.C. Customer Service Office whose telephone number is (703) 306-0377.



LEO BOUDREAU  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2600

AA  
Group Art Unit 2621  
02 February 2004